

# Configuration Management Awareness



Prepared by ASD-220



# Course Objectives

## ☑ Upon completion of this course, you will be able to:

- ⇒ Explain how configuration management (CM) plays a significant role in accomplishing the FAA mission
- ⇒ Describe the primary functions of CM and understand the activities associated with each
- ⇒ Describe the various mechanisms the FAA is using to implement CM



# Course Outline

- ☑ **FAA Strategic Focus**
- ☑ **Strategic FAA CM Vision**
- ☑ **CM Benefits**
- ☑ **CM Definition**
- ☑ **CM Tenets**
- ☑ **FAA CM Implementation**



# Configuration Management Definition

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**Management of system changes over time.**



# FAA Strategic Focus

## ☑ Agency Mission

⇒ Provide a safe, secure, and efficient global aerospace system that contributes to national security and the promotion of the U.S.

## ☑ Agency Vision

⇒ Provide the safest, most efficient, and most responsive aerospace system in the world and to be the best Federal employer, continuously improving service to customers and employees.



# Strategic FAA CM Vision

*An integrated agency-wide CM discipline that.....*

- ⇒ supports planning, life cycle management and decision making in the FAA systems
- ⇒ satisfies stakeholder needs with accurate, current information throughout the NAS life cycle
- ⇒ is traceable to the NAS Architecture
- ⇒ reduces the cost of developing, deploying, operating, and maintaining ATC systems and FAA facilities
- ⇒ reduces risk of failures
- ⇒ is consistent with evolving FAA business rules



# The Importance of CM – Examples

## SHORTFALLS

### Repeated Site Surveys

### “Go-Back” Teams

## PROBLEMS

- Inaccessible/unreliable system and site information

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- Uninstalled modifications

## CM BENEFITS

- Accessible data
- High level of confidence in product information
- Cost/schedule savings

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- High level of confidence in product information
- Cost/schedule savings
- Supportability





# The Importance of CM – Examples

## SHORTFALLS

### Non-Supportable Operational Systems

- Variations in site configurations and products
- Uninstalled modifications
- Unreported changes

### Safety Risk

- Lack of CM procedures
- Unauthorized change
- Undocumented system configuration

### Requirements Creep

- Loosely managed technical requirements

## PROBLEMS

## CM BENEFITS

- Proper replacement and repair
- Decreased delays, product down-time, and maintenance costs

- Controlled changes
- High level of confidence in product information

- Controlled changes
- Cost/schedule savings



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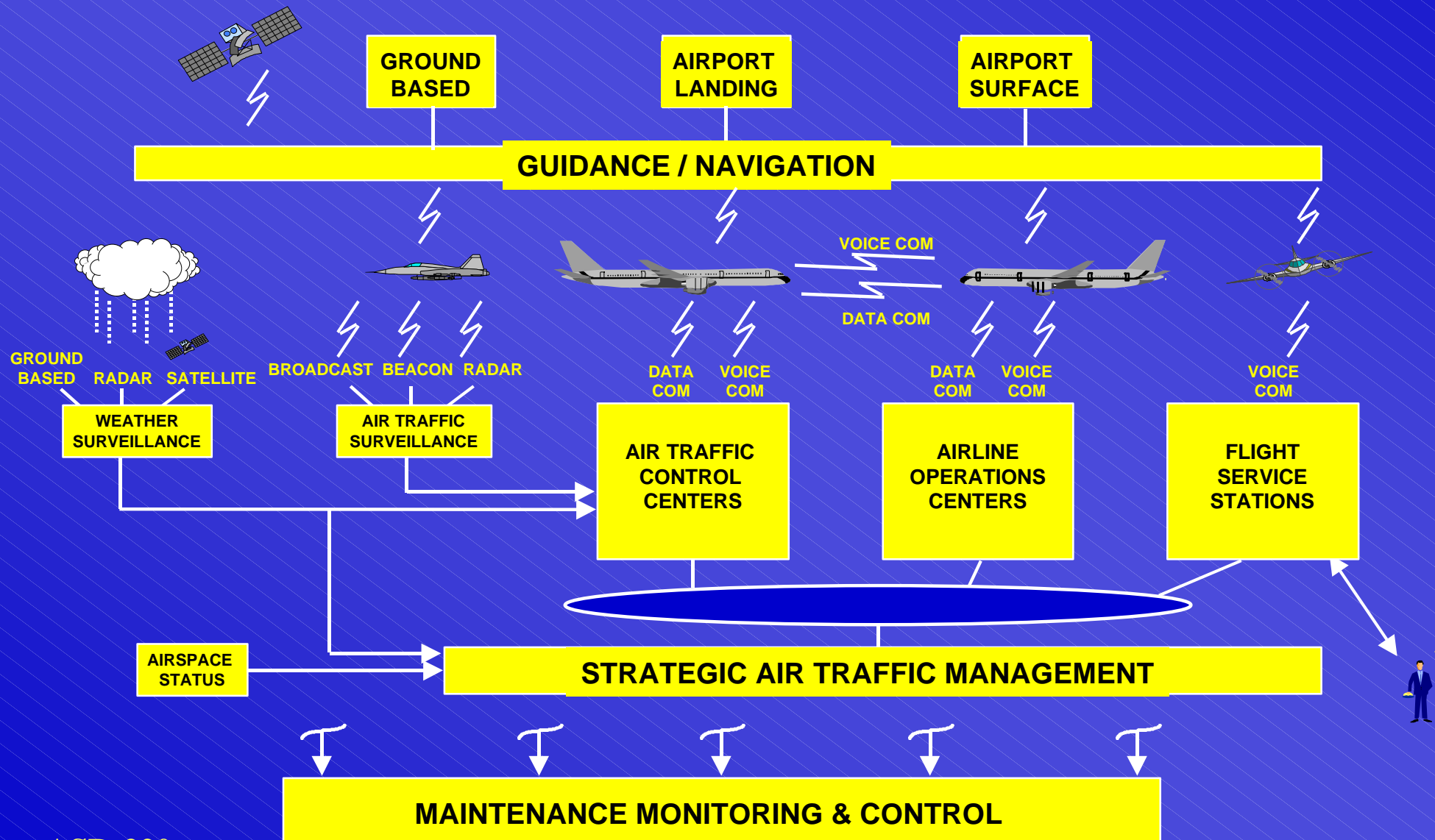
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**Management of system changes over time.**



# Configuration Management: National Airspace System





# CM Tenets

- ☑ CM Life-Cycle Management and Planning
- ☑ Configuration Identification
- ☑ Configuration Control
- ☑ Configuration Status Accounting (CSA)
- ☑ Configuration Verification and Audit
- ☑ Data Management



# CM Life-Cycle Management and Planning

## ☑ Definition:

⇒ Management activities including planning for and selecting the key actions to implement (and measure the effectiveness of) configuration identification, control, status accounting, and audit, throughout the program life-cycle. (MIL-HDBK-61)



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**Planning/allocating resources for implementing  
CM over all phases of the life cycle.**





# CM Life-Cycle Management and Planning

## ☑ Activities:

- ⇒ Preparing for each life-cycle phase (resources, personnel, tools, facilities, systems compatibility, etc.)
- ⇒ Implementing Government CM process
- ⇒ Measuring/evaluating Government and vendor CM processes and performance
- ⇒ Effecting process improvements
- ⇒ Documenting lessons learned
- ⇒ Interface management
- ⇒ Vendor selection/control: COTS/equipment





# Configuration Identification

## ☑ Definition:

⇒ The selection of configuration identifiers (CIs); the determination of the types of configuration documentation required for each CI; the issuance of numbers and other identifiers affixed to the CIs and to the technical documentation that defines the CI's configuration, including internal and external interfaces; the release of CIs and their associated configuration documentation; and the establishment of configuration baselines for CIs. (MIL-STD-973)



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**Defining the technical description and  
unique identifiers of a product.**



# Configuration Identification

## ☑ Activities:

⇒ Selecting/defining configuration items

- ◆ Configuration item: an aggregate of hardware or software that satisfies an end-use function

⇒ Generating parts/items identifiers

- ◆ Consistent nomenclature
- ◆ Reflects relative arrangement of parts

⇒ Generating releases

- ◆ Release: a designating activity that verifies that documents, hardware, drawings, and/or code is complete and suitable for use

⇒ Providing media identification



# Configuration Identification

## ☑ Activities (cont.):

### ⇒ Freezing baselines

- ◆ Baseline: a collection of formal configuration documentation
- ◆ Typical baselines include:
  - Functional Baseline
  - Allocated Baseline
  - Developmental Baseline
  - Product Baseline



# Configuration Control

## ☑ Definition:

- ⇒ A systematic process that ensures that changes to a baseline are properly identified, documented, evaluated for impact, approved by an appropriate level of authority, incorporated, and verified.
- ⇒ The CM activity concerning the systematic proposal, justification, evaluation, coordination, and disposition of proposed changes, and the implementation of all approved and released changes, into the applicable configurations of a product, the associated product information, and supporting and interfacing products and their associated product information.  
(EIA 649)



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**Establishing initial configuration and  
controlling changes to that configuration.**





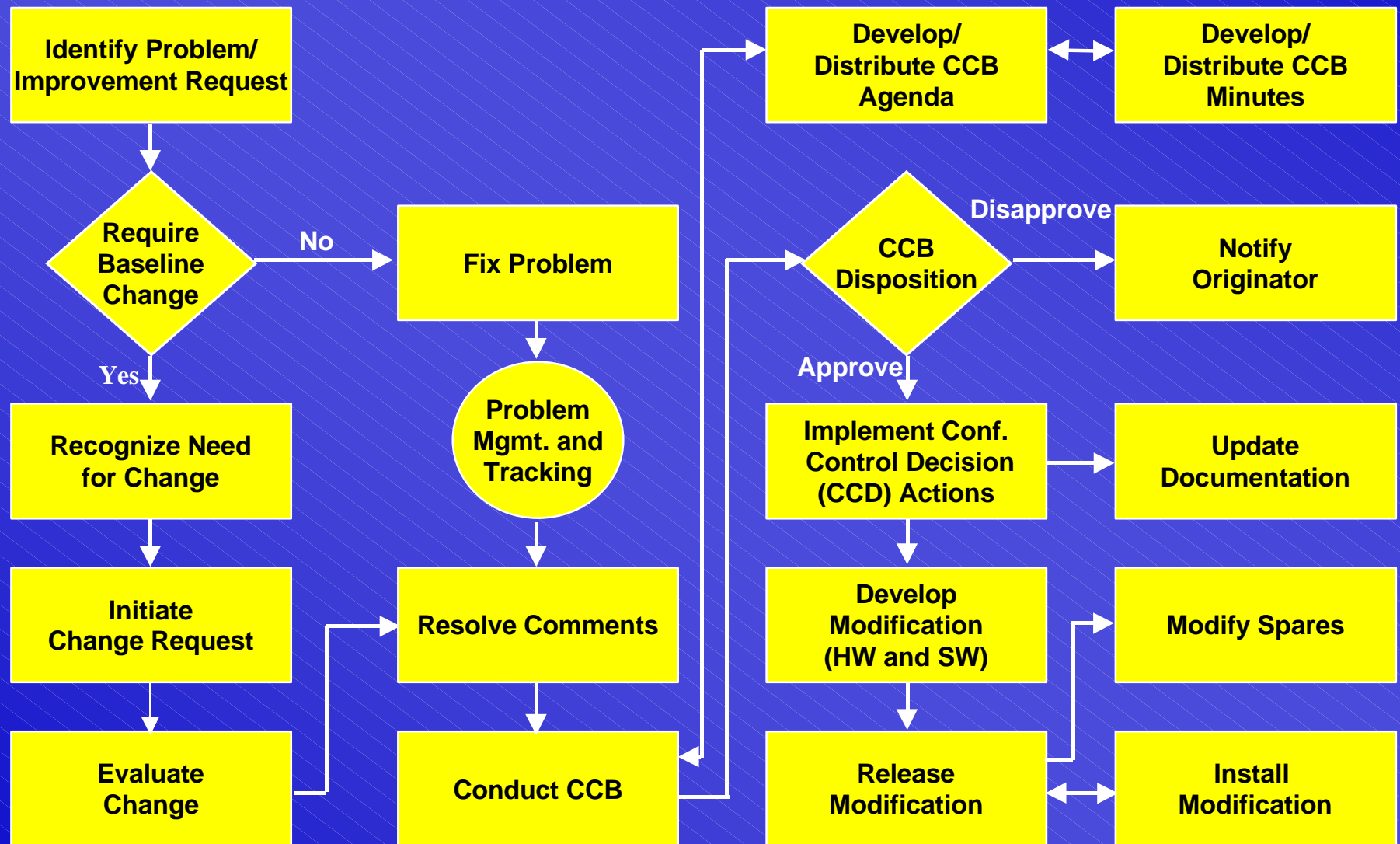
# Configuration Control

## ☑ Activities

- ⇒ Processing changes to baselines/releases
  - ◆ Change classification
  - ◆ Change approval/disapproval
  - ◆ Change prioritization
- ⇒ Mechanisms for initiating changes include NAS Change Proposals (NCPs), Engineering Change Proposals (ECPs), Notices of Revision (NORs), variances, etc.
- ⇒ Organizing/managing configuration control boards (CCBs)
  - ◆ Authority
  - ◆ Membership
  - ◆ Charter
  - ◆ Operating Procedures



# Typical Change Control Process







# Configuration Status Accounting (CSA)

## ☑ Definition:

⇒ The configuration management activity concerning the capture, storage, and access to information needed to manage products and product information effectively. (EIA 649)



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**Identifying the approved configuration of an item or items and report status.**



# Configuration Status Accounting

## ☑ Activities:

⇒ Information recording

- ◆ Approved configuration documentation
- ◆ Proposed changes: NAS Change Proposals (NCPs)
- ◆ Deviations
- ◆ Results of configuration audits
- ◆ Status of authorized changes
- ◆ Meeting minutes (CCBs, ICWGs, etc.)
- ◆ Other documents

⇒ Information maintenance

⇒ Data dissemination

⇒ Metrics



# Configuration Verification and Audit

## ☑ Definition:

⇒ Inspecting documents, products and records, and review procedures, processes, and systems of operation to authenticate that the product's required attributes (performance requirements and functional constraints) have been achieved by the product and the product's design has been accurately documented.  
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**Inspecting functional and physical characteristics of an item or items.**



# Configuration Verification and Audit

## ☑ Activities:

- ⇒ Audit planning
- ⇒ In-process (internal) audits
- ⇒ Functional Configuration Audit (FCA): verifies that a configuration item has achieved the requirements specified in its functional and allocated configuration documentation
- ⇒ Physical Configuration Audit (PCA): verifies the “as-built” configuration of a configuration item against its technical documentation; establishes the configuration item’s product baseline
- ⇒ Re-baselining audits



# Data Management

## ☑ Definition:

- ⇒ Management of recorded information, regardless of medium or characteristics, of any nature, including administrative, managerial, financial, and technical. (EIA 649)
- ⇒ Data management encompasses digital data, i.e., information prepared by electronic means and made available to users by electronic data access, interchange, transfer, and/or electronic/magnetic media. (MIL-HDBK-61)





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**Data standards, identification, modification,  
access, and dissemination.**





# Data Management

## ☑ Activities:

- ⇒ File identification
- ⇒ Disks/tapes
  - ◆ Identification/labeling
  - ◆ Information validation
  - ◆ Backups
- ⇒ Version control
- ⇒ Data transmittal
- ⇒ Access control
- ⇒ Platform control
- ⇒ Data retention/archiving



# FAA CM Implementation

- ☑ CM Steering Group and Core Team
- ☑ FAA CM Policy
- ☑ FAA-iCMM
- ☑ FAA Life-Cycle CM Process
- ☑ Interim CM Guidance
- ☑ Other CM References



# CM Steering Group (CMSG) Purpose

- ☑ The CMSG is an agency-wide forum of senior managers dedicated to the establishment and promotion of an integrated FAA CM discipline that supports the FAA mission.
- ☑ Organizations participating in the CMSG:

## *ASD-200, Chair*

<i>AAR-600</i>	<i>ACE-470</i>	<i>ACT-200</i>	<i>ACT-300</i>	<i>AIR-500</i>
<i>AIT-500</i>	<i>AND-100</i>	<i>AND-300</i>	<i>AND-400</i>	<i>AND-700</i>
<i>AML-1</i>	<i>ANI-1</i>	<i>ANS-2</i>	<i>AOP-1</i>	<i>AOS-1</i>
<i>ARN-1</i>	<i>ARU -1</i>	<i>ARX-1</i>	<i>ASD-100</i>	<i>ATO-1</i>
<i>AUA-200</i>	<i>AUA-300</i>	<i>AUA-400</i>	<i>AUA-500</i>	<i>AUA-600</i>



# CM Core Team

- ☑ **The CM Core Team is a working body created by the CMSG for the following functions:**
  - ⇒ **Define agency-wide CM requirements and processes**
  - ⇒ **Provide CMSG updated version of CM Implementation Plan**
  - ⇒ **Make recommendations on coordinating CM efforts**



# CM Working Groups

## Organization

*Establish an independent CM authority.*

## Policy

*Develop and publish a single FAA life-cycle CM policy.*

## Process

*Continue development of a uniform life-cycle process; implement that process.*



## Information Management

*Define CM information needs, develop an FAA CM information architecture, and leverage information technology.*

## Resources

*Define resource requirements for FAA Life-Cycle CM activities.*



# FAA CM Policy

- ☑ **CM performed throughout all phases of a system's life-cycle**
- ☑ **CCBs establish baselines and approve/disapprove changes**
  - ⇒ NAS CCB
  - ⇒ IPT CCBs
  - ⇒ Regional CCBs
  - ⇒ Other CCBs (e.g., ANF CCB)
- ☑ **Specifications maintained in current state and readily available**
- ☑ **COTS/NDI/CAS systems maintained under CM control**
- ☑ **CM principles apply to the management of digital data**



# FAA CM Policy (cont.)

## ☑ Centralized CM authority for FAA (ASD-200)

⇒ Establishes corporate FAA CM policy

- ◆ Monitoring
- ◆ Oversight
- ◆ Evaluation

⇒ Assigns FAA identifiers

- ◆ Type numbers
- ◆ Specification numbers
- ◆ IRD/ICD identifiers

⇒ Publishes NAS-MD-001 (Master Configuration Index)



# FAA CM Policy (cont.)

## ☑ NAS CCB

⇒ Manages

- ◆ Technical requirements of the NAS
- ◆ Interface documentation
- ◆ Inter-IPT issue resolution
- ◆ IRD baselining

⇒ Approves changes to the technical representation of the NAS

⇒ Approves IPT CCB charters

⇒ Approves Regional CCB charters





# FAA CM Policy (cont.)

## ☑ Integrated Product Teams (IPTs)

- ⇒ Implement CM plans and processes
- ⇒ Establish and maintain IPT baselines
- ⇒ Approve/disapprove proposed changes under their purview
  - ◆ Impacts with other IPTs must be coordinated with the affected IPTs
  - ◆ If differences between the IPTs cannot be resolved or if the proposed changes affect NAS-level requirements, changes must be referred to the NAS CCB
- ⇒ Must identify funding sources for changes



# FAA CM Policy (cont.)

## ☑ Regional CCBs

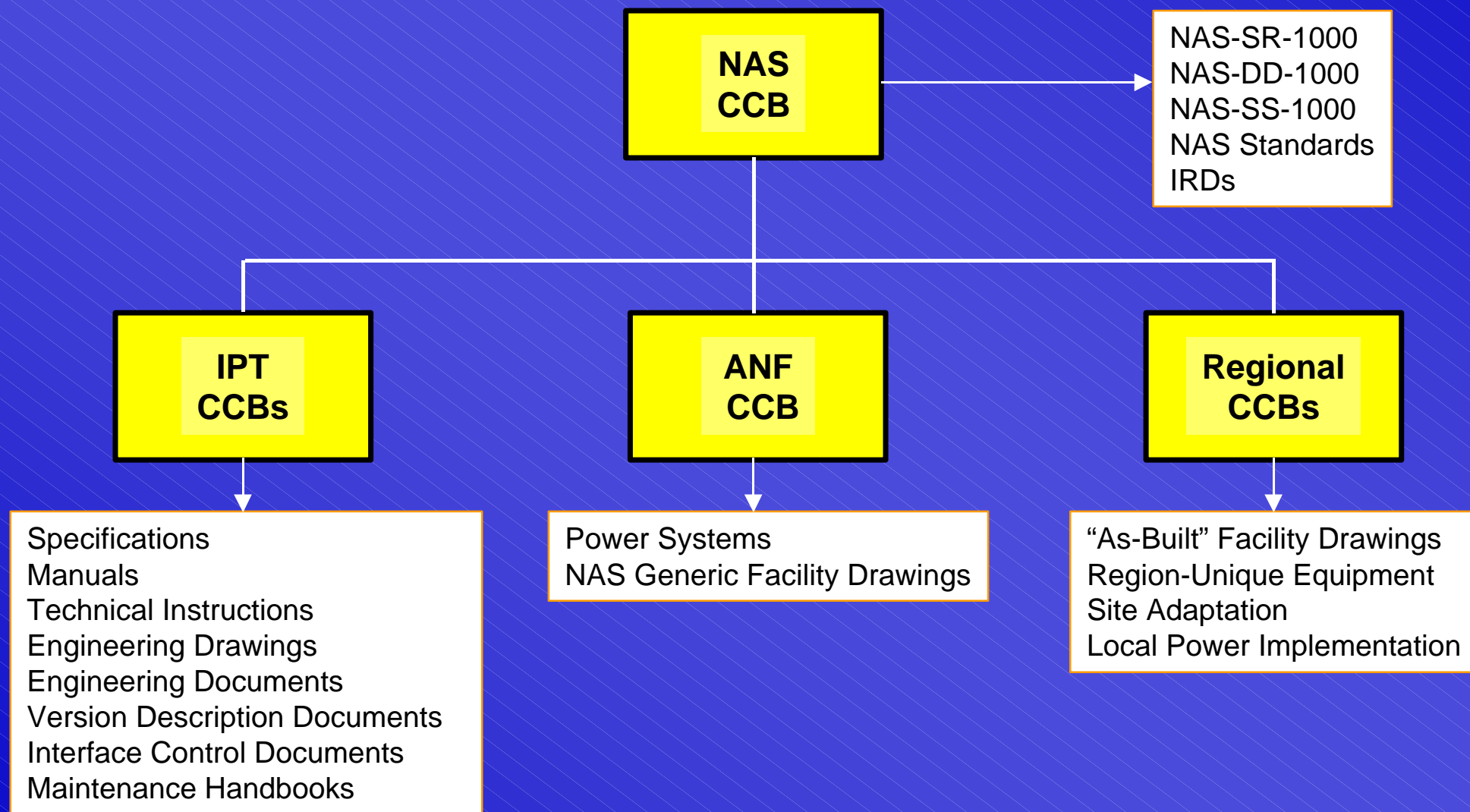
- ⇒ Control changes to site adaptation, region-unique equipment, local space management, and local implementation of national power policy
- ⇒ Conduct periodic audits

## ☑ Other Solution Provider CCBs

- ⇒ ANF CCB
  - ◆ Control changes to space management and critical power (ANS NAS level)
  - ◆ Conduct periodic audits



# FAA CM Policy: CCB Summary





# FAA-iCMM

- ☑ CM Training
- ☑ CM as a Process Area (PA)
- ☑ CM as a Generic Practice (GP)
- ☑ CM in relation to other PAs



# Role of CM in the FAA-iCMM

- ☑ **PA 16 – Configuration Management**
- ☑ **Defining the CM policy corresponds to Base Practice (BP) 16.01**
- ☑ **CM tenets correspond to the remaining BPs**
  - ⇒ Configuration Identification – BP 16.02
  - ⇒ Data Management – BP 16.03
  - ⇒ Configuration Control – BP 16.04
  - ⇒ Configuration Status Accounting – BP 16.05
  - ⇒ Configuration Audit – BP 16.06



# Other CM Roles

- ☑ **Generic Practice 2.8 – Manage Configurations applies to *all* PAs**
- ☑ **CM has *special* applicability to the following Level 2 PAs:**
  - ⇒ PA 02, Requirements
  - ⇒ PA 08, System Test and Evaluation
  - ⇒ PA 09, Transition
  - ⇒ PA 11, Project Management
  - ⇒ PA 12, Contract Management
  - ⇒ PA 15, Quality Assurance and Management



# FAA CM Life-Cycle Process Document

- ☑ **Currently under development**
- ☑ **Will be available September 1998**
- ☑ **Provides FAA-specific CM information to managers and CM practitioners**
- ☑ **Consists of:**
  - ⇒ Process flow diagrams
  - ⇒ Process definitions





# Interim CM Guidance

- ☑ **Available for IPTs until superseded by the formal FAA CM Policy**
- ☑ **Summarizes ASD-220 and IPT roles and responsibilities**
- ☑ **Provides definitions of CM principles; each definition includes:**
  - ⇒ A list of standard process elements
  - ⇒ The activity blocks of the Life Cycle Process that reference the CM principles
- ☑ **Provides additional guides:**
  - ⇒ CM standards reference list
  - ⇒ Acronyms/definitions



# Other CM References

## ☑ **MIL-HDBK-61, Configuration Management Guidance**

- ⇒ Designed for Government audience
- ⇒ Guidance only; cannot be used as a requirement
- ⇒ Closely related to the standards listed below

## ☑ **EIA 649, National Consensus Standard for Configuration Management**

- ⇒ Summary of industry-proven best CM practices

## ☑ **MIL-STD-2549, Configuration Management Data Interface**

- ⇒ Interface requirements for exchange of CM information in CM databases

## ☑ **EIA 632, Processes for Engineering a System**

- ⇒ Describes system engineering process of which CM is a part



## Other CM References (cont.)

### ☑ **MIL-STD-973, Configuration Management**

⇒ DoD CM standard; no longer used as a contract requirement for new contracts, but still widely referenced

### ☑ **The Federal Aviation Administration Integrated Capability Maturity Model<sup>sm</sup> (FAA-iCMM<sup>®</sup>), Version 1.0**

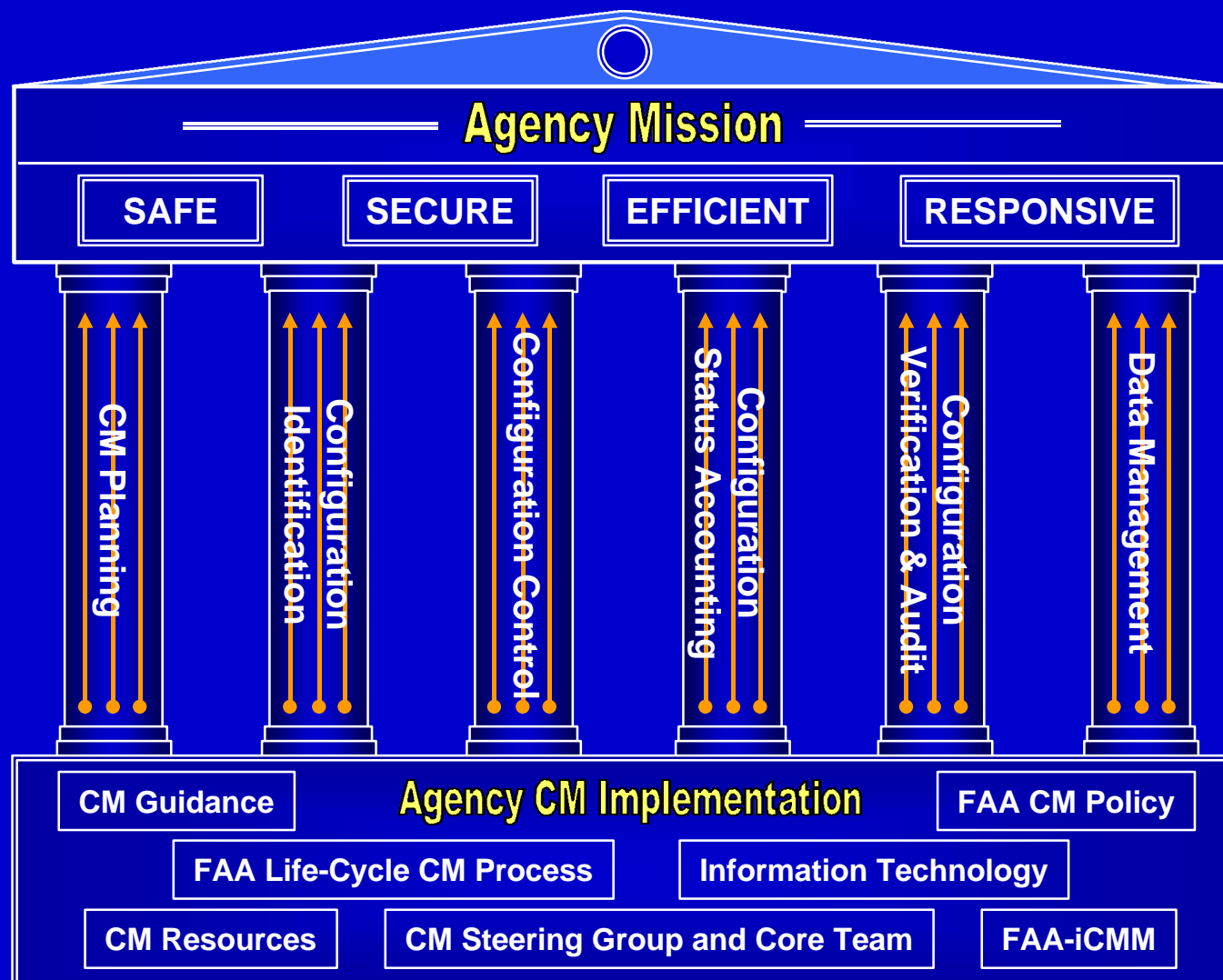
⇒ Describes the integrated Capability Maturity Model

⇒ Internet URL: <http://www.faa.gov/ait/ait5/FAA-iCMM.htm>

### ☑ **FAA Intranet Page**

⇒ URL: <http://www.faa.gov>; “Intranet” button

⇒ Addresses FAA-wide issues, including CM topics



### CM Benefits

- Measurable Performance Parameters
- Correct, current info for decision-making
  - Accessible Data
- Cost/Schedule Savings
  - Controlled Changes
  - Decreased Delays, product down-time, and maintenance costs
- Proper Replacement and Repair
- High level of confidence in product info

### CM Prevents

- Repeated Site Surveys
- "Go-Back" Teams
- Non-Supportable Operational Systems
  - Safety Risk
- Requirements Creep



QUESTIONS?



# Acronyms

<b>AMS</b>	<b>Acquisition Management System</b>
<b>ATC</b>	<b>Air Traffic Control</b>
<b>BP</b>	<b>Base Practice</b>
<b>CAS</b>	<b>Commercially Available Software</b>
<b>CCB</b>	<b>Configuration Control Board</b>
<b>CCD</b>	<b>Change Control Decision</b>
<b>CI</b>	<b>Configuration Item</b>
<b>CM</b>	<b>Configuration Management</b>
<b>CMM</b>	<b>Capability Maturity Model</b>
<b>CMSG</b>	<b>Configuration Management Steering Group</b>
<b>COTS</b>	<b>Commercial Off-The-Shelf</b>
<b>CSA</b>	<b>Configuration Status Accounting</b>
<b>DCC</b>	<b>Document Control Center</b>
<b>DM</b>	<b>Data Management</b>



# Acronyms (cont.)

<b>ECP</b>	<b>Engineering Change Proposal</b>
<b>FAA</b>	<b>Federal Aviation Administration</b>
<b>FAA-iCMM</b>	<b>FAA Integrated Capability Maturity Model</b>
<b>FCA</b>	<b>Functional Configuration Audit</b>
<b>GP</b>	<b>Generic Practice</b>
<b>HW</b>	<b>Hardware</b>
<b>ICD</b>	<b>Interface Control Document</b>
<b>ICWG</b>	<b>Interface Control Working Group</b>
<b>IPT</b>	<b>Integrated Process Team</b>
<b>IRD</b>	<b>Interface Requirements Document</b>
<b>NAS</b>	<b>National Airspace System</b>
<b>NCP</b>	<b>NAS Change Proposal</b>
<b>NDI</b>	<b>Non-Developmental Item</b>
<b>NOR</b>	<b>Notice of Revision</b>





# Acronyms (cont.)

<b>ORD</b>	<b>Operational Requirements Document</b>
<b>PA</b>	<b>Process Area</b>
<b>PCA</b>	<b>Physical Configuration Audit</b>
<b>QA</b>	<b>Quality Assurance</b>
<b>RFP</b>	<b>Request for Proposal</b>
<b>SEI</b>	<b>Software Engineering Institute</b>
<b>SIR</b>	<b>Screening Information Request</b>
<b>SW</b>	<b>Software</b>
<b>VDD</b>	<b>Version Description Document</b>